dency of Prof. Auwers ; the secretary is Prof. Schœnfeld, director of the Observatory at Bonn.

The last part of the *Vierteljahrsschrift* contains reports of the proceedings during the year 1882, from twenty-eight continental observatories, public and private. Also a portrait of the late Prof. Plantamour of Geneva.

EPHEMERIDES OF THE SATELLITES.—The last number of the *Monthly Notices of the Royal Astronomical Society* contains Mr. Marth's extensive ephemerides of the satellites of Saturn (excepting *Hyperion*), Uranus, and Neptune for their next oppositions, as well as data to facilitate the reduction of physical observations of Jupiter. *Hyperion* will have been omitted from want of reliable elements. Prof. Newcomb, however, is in possession of manuscript tables, which he has utilised in the *American Ephemeris* for 1883 ; we extract the early portion of his table : I represents inferior, and S superior, conjunction ; E, east, and W, west elongation ; the times are for the meridian of Washington (5h. 8m. west of Greenwich) :—

	h.			h.			h.	
Aug.	18, 2·9	E ...	Sept.	8, 10·6	E ...	Sept.	29, 17·0	E
	23, 10·9	I ...		13, 18·4	I ...	Oct.	5, 0·6	I
	28, 18·8	W ...		19, 1·9	W ...		10, 8·0	W
Sept.	3, 2·7	S ...		24, 9·5	S ...		15, 15·5	S

SCIENTIFIC SERIALS

Journal de Physique Théorique et Appliqué, July, 1883.—On the theory of electromagnetic machines, by J. Joubert.—Experiments on the aurora borealis in Lapland, by S. Lemström.—Note on a spectroscope with inclined slit, by M. Garbe.—A differential thermometer for class demonstration, by H. Dufour.—An addition to Atwood's machine, by A. Béquié.—The determination of the ohm by dynamometric methods, translated by M. Brillouin.—Electrochemical figure, with diagram, translated by Adrien Guébhard.

Rendiconti of the *Royal Lombard Institute of Sciences and Letters*, June 28, 1883.—On the theory of the potential, by Prof. E. Beltrami.—Note on the latitude of Milan, deduced from calculations of distances from the zenith observed near the meridian, by M. E. G. Celoria. In this concluding paper the author fixes the exact latitude of Milan (centre of the large tower of the observatory), at $45^\circ\ 27'\ 59''{\cdot}34 \pm 0''{\cdot}09 \ldots A_1$.—On the kinematic significance of wave surface, by Dr. G. A. Maggi.—Observations on the figure of the planet Uranus, by E. G. V. Schiaparelli. Besides calculating its ellipticity, which agrees with the conclusions of Mädler and Shafarik, the author determines the presence of spots and changes of colour on the surface of Uranus.—Results of a microscopic analysis of the drinking water at Cadempino, Canton of Ticino, Switzerland, by Prof. L. Maggi.—A case of policheiria (abnormal number of claws) in a freshwater crab (*Astacus fluviatilis*, Rond.), by Dr. E. Cantoni. Appended to the paper is a bibliography of crustacean teratology.—Remarkable results obtained by the treatment of pulmonary tuberculosis with iodoform, by Prof. G. Sormani.—On a Russian scheme of international exchanges, by Prof. E. Vidardi.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, June 21.—"Supplement to former Paper entitled—'Experimental Inquiry into the Composition of some of the Animals Fed and Slaughtered as Human Food'—*Composition of the Ash of the Entire Animals and of certain Separated Parts.*" By Sir John Bennet Lawes, Bart., LL.D., F.R.S., F.C.S., and Joseph Henry Gilbert, Ph.D., LL.D., F.R.S., V.P.C.S.

In a former paper (*Phil. Trans.*, Part II. 1859) the authors had given the actual weights, and the percentage proportion in the entire body, of the individual organs, and of certain more arbitrarily separated parts, of 326 animals—oxen, sheep, and pigs—in different conditions as to age, maturity, fatness, &c. They called particular attention to the wide difference in the proportion by weight of the stomachs and intestines in the three descriptions of animal ; the proportion of stomach and contents being very much the highest in oxen, considerably less in sheep, and little more than one-tenth as much in pigs as in oxen. On the other hand, the intestines and contents contributed a less proportion to the weight of the body in oxen than in either sheep or pigs ; the percentage by weight in pigs being nearly twice as high as in sheep, and more than twice as high as in oxen. With these very characteristic differences in the proportion of the receptacles and first laboratories of the food the other internal organs collectively, as also the blood, contributed a pretty equal proportion by weight of the entire body, in the three descriptions of animal.

Ten animals had been selected for the determination of the chemical composition, namely—a fat calf, a half-fat ox, and a fat ox ; a fat lamb, a store sheep, a half-fat sheep, a fat sheep, and a very fat sheep ; a store pig, and a fat pig. In these, in the collective carcass parts, in the collective offal parts, and in the entire bodies, the total nitrogenous substance, the total fat, the total mineral matter, the total dry substance, and the water, were determined ; and the results were recorded and discussed in detail.

It was shown that, as the animal fattened, the percentage of nitrogenous substance decreased considerably, whilst that of the fat and of the total dry matter increased in a much greater degree. It was estimated that the portions of well fattened animals which would be consumed as human food would contain three, four, and even more times as much fat as dry nitrogenous substance : and comparing such animal food with wheat-flour bread, it was concluded that, taking into consideration the much higher capacity for oxidation of a given weight of fat than of starch, such animal food contributed a much higher proportion of non-nitrogenous substance, reckoned as starch, to one of nitrogenous substance than bread. In fact the introduction of our staple animal foods to supplement our otherwise mainly farinaceous diet did not increase, but reduced the relation of the flesh-forming material to the respiratory and fat-forming capacity of the food.

Finally, the actual amount and the percentage of total ash in most of the internal organs and some other separated parts were given. It was shown that the percentage of total mineral matter, like that of the nitrogenous substance, decreased not only in the entire body, but especially in the collective carcass parts, as the animals matured. It was the object of the present communication to record the results of the complete analysis of the ashes of the collective carcass parts, of the collective offal parts, and of all parts of each of the ten animals. Forty complete ash analyses had been made.

As was to be expected, more than four-fifths of the ashes consisted of phosphoric acid, lime, and magnesia ; these making up the largest amount in the ash of the oxen, less in that of sheep, and less still in that of pigs. Potash and soda were also prominent constituents. Assuming, for the purposes of illustration merely, that one of phosphoric acid was combined with three of fixed base, the ashes of the ruminants showed an excess of base ; whereas, according to the same mode of calculation, the ashes of the pigs showed no such excess.

It was, unfortunately, only in the case of the offal parts of the pigs that the ash of the chiefly bony and that of the chiefly soft parts had been analysed separately. The results showed a considerable excess of acid, especially phosphoric, in the ash of the non-bony portions ; presumably, in part at any rate, due to the oxidation of phosphorus in the incineration. In further reference to the point in question it may be stated that, although the oxen and sheep show a higher percentage of total nitrogenous substance than the pigs, yet, owing to the relatively small proportion of bone in the pigs, the amount of ash yielded from the non-bony parts is higher in proportion to that from the bones in their case than in that of the ruminants.

Comparing the percentage composition of the ashes of the entire bodies of the different animals, the chief points of distinction were that in the ash of the pigs there is a lower percentage of lime and a higher percentage of potash and soda than in the corresponding ash of the ruminants ; there is a somewhat higher percentage of phosphoric acid in the ash of the pigs and of the oxen than in that of the sheep ; and there is a higher percentage of sulphuric acid (and somewhat of chlorine also) in the ash of the pigs than in that of the other animals.

A table showing the quantities of total ash, and of each individual mineral constituent, in each of the ten animals analysed was given. Not much stress was laid on the amounts in the particular animals analysed, as the actual weights and condition of animals coming under similar designations may vary considerably.

It was of more interest to consider the amounts of the mineral constituents in carcass parts, in offal parts, and in all parts per 1000 lbs. fasted live-weight, of each description of animal.

It was shown that a given live-weight of oxen carried off much

more mineral matter than the same weight of sheep, and a given weight of sheep much more than the same weight of pigs. With each description of animal the amounts of phosphoric acid, lime, and magnesia, are less in a given live-weight of the fatter than of the comparable leaner individuals. Of both potash and soda, again, the quantity is less in a given live-weight of the fatter animals. The same may be said of the sulphuric acid and the chlorine; in fact, in a greater or less degree, of every one of the mineral constituents.

It was estimated that the loss to the farm of mineral constituents by the production and sale of mere fattening increase was very small. It was greater of course in the case of growing than of only fattening animals. In illustration, the amounts of some of the most important mineral constituents removed annually from an acre of fair average pasture and arable land in various products were compared. Such estimates could obviously be only approximate, and the quantities will vary considerably. With this reservation it may be stated that, of phosphoric acid, an acre would lose more in milk, and four or five times as much in wheat or barley grain, or in hay, as in the fattening increase of oxen or sheep. Of lime, the land would lose about twice as much in the animal increase as in milk, or in wheat or barley grain; but perhaps not more than one-tenth as much as in hay. Of potash, again, an acre would yield only a fraction of a pound in animal increase, six or eight times as much in milk, twenty or thirty times as much in wheat or barley grain, and more than 100 times as much in hay.

From the point of view of the physiologist, it would doubtless have been desirable that the selection of parts for the preparation and analysis of the ash should have been different, and more detailed. The agricultural aspects of the subject had, however, necessarily influenced the course of the inquiry; and the extent of the essential work had enforced the limitation which had been adopted. The results must be accepted as a substantial contribution to the chemical statistics of the feeding of the animals of the farm for human food.

PARIS

Academy of Sciences, July 23.—M. Blanchard, president, in the chair.—Historic importance of Nicolas Leblanc's discovery of the method of extracting artificial soda from marine salt, by M. Dumas. To this great discovery, which the author compares with that of the steam-engine by Watt, is traced the vast development of the chemical industries during the last hundred years. The present annual consumption of the carbonate of soda resulting from Leblanc's process is estimated at from 700,000,000 to 800,000,000 kilograms in Europe and America. Yet the name of the discoverer had almost been forgotten till recently revived by the municipality of his birthplace, Issoudun, which now proposes to erect a monument to his memory.—Active or dynamic resistance of solids (continued). Graphic representation of the laws of longitudinal thrust applied to one end of a prismatic rod, the other end of which is fixed, by MM. de Saint-Venant and Flamant.—Method of distributing the heat developed in the process of forging, by M. Tresca.—Description of the new apparatus about to be fitted up in the Paris Observatory for the purpose of studying the movements of the sun, by M. C. Wolf. This mechanism, which is based on the same principle as that adopted by G. and H. Darwin in the Cavendish laboratory, Cambridge, is intended more especially for the observation of solar oscillations and deviations from the vertical.—On the present outbreak of cholera in Egypt, and on the probability of Europe escaping its ravages, by M. A. Fauvel. Every day tended to diminish the chance of an invasion, and should the epidemic be staved off for the next four or five weeks there would be little cause for further apprehension, as it was expected from past experiences that Egypt itself would be entirely free within six weeks at the outside. With regard to the prediction confidently made in many quarters, that the epidemic would reach the mainland through England, the author remarked that on the contrary it had on all previous occasions found its way to England from the Baltic ports on the mainland. He regarded Greece and Spain as in any case free from danger, and thought that in case it appeared on the French seaboard it might easily be prevented from spreading inland by carefully isolating the patients. He considered that the two cities most exposed to its attacks were Constantinople and Trieste, the former through Syria and Asia Minor, the latter through the arrival of immigrants escaping from Egypt. Notwithstanding the recent disclosures made on the spot, he still holds the view that the cholera was originally introduced into Egypt from Bombay in consequence of the suspension of the precautionary measures formerly adopted by the Egyptian Government against the epidemic.—On the origin of the nitrogen existing in combination on the surface of the earth, by MM. A. Müntz and E. Aubin. Nitrogenous combinations are due in the first instance to the electric phenomena of which the terrestrial atmosphere is the seat. These phenomena appear to have been much more intense in remote geological epochs than since the appearance of animal and vegetable life on the earth. Hence it would seem that we are now depending on a constantly diminishing stock of combined nitrogen, and the process of diminution must go on unless atmospheric electricity prove to be a source of sufficient reparation.—On the adaptation to viticulture of the sandy tracts of the Landes and Gironde in the south-west of France, by M. A. Robinson.—Experimental researches on the action of a liquid introduced by a special process into the tissues of the vine for the purpose of destroying phylloxera, by M. P. de Lafitte. Sulphate of copper diluted in water is recommended as best answering all the conditions, and consequently as the surest antidote to the evil.—On some linear differential equations of the fourth order, by M. Halphen.—On certain special solutions of the problem of the three bodies, by M. H. Poincaré.—On some recently observed solar perturbations, by Admiral Mouchez.—On a universal galvanometer without oscillatory action, adapted for the measurement of currents of great intensity or of high tension, with illustration, by M. Ducretet.—On the nitric derivatives of hydride of ethylene, by M. Berthelot.—On some derivatives of mannitic hexylene, by M. Wurtz.—On the products derived from the bacterian fermentation of albuminoids, by MM. Arm. Gautier and A. Etard.—On the supposed transformation of brucine into strychnine, by M. Hanriot.—On the heat-generating power of coal, by M. Scheurer-Kestner.—On the physiological properties of the bark of the dundaké (a West African shrub) and of dundakine, by MM. Bochefontaine, B. Feris, and Marcus.—On the nervous chords in the foot of the heliotides, by M. H. Wegmann.—On the temperatures of the sea observed at Concarneau and Douarnenez, by M. Goez.—A reply to M. Certes on the subject of the method proposed by him for examining corpuscles held in suspension in water, by M. Eug. Marchand.

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